

# Geospatial Semantic Interoperability

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*INTEROP – Spatial Ontology Community of Practice:  
an Interdisciplinary Network to Support  
Geospatial Data Sharing, Integration, and Interoperability*

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*University of Wisconsin - Madison*



**SOCOP INTEROP**  
**CYBERINFRASTRUCTURE**

NSF Meeting January 2012

# SOCoP INTEROP

- Goals
  - Apply and develop semantic technologies for the Geospatial domain
  - Share ontologies to promote data interoperability
- Submitted by 8 members of SOCoP :
  - **Gary Berg-Cross** - Knowledge Strategies/SOCoP officer
  - **Mike Dean and Dave Kolas** – Raytheon BBN Technologies
  - **John Moeller** - JJMoeller and Associates/SOCoP officer
  - **Nancy Wiegand** - University of Wisconsin-Madison,
  - **James Wilson** - James Madison University
  - **Peter Yim** - CIM3 Engineering, Inc.
  - **Naijun Zhou** - University of Maryland College Park



# Spatial Ontology Community of Practice

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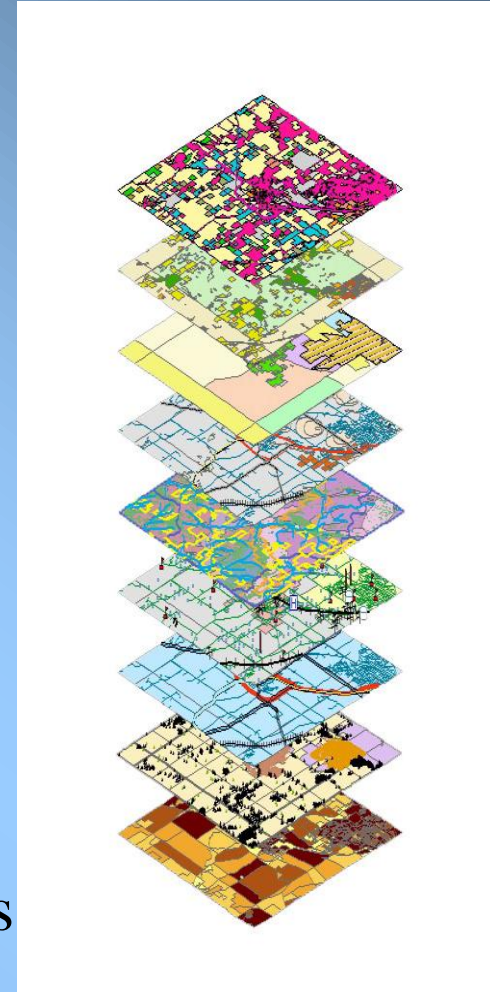
- **SOCoP** – National level group of practitioners, academic researchers, federal agency workers, industry representatives
- Started in 2006, <http://www.socop.org>
- Recognize the need for **semantic** interoperability for geospatial data and the potential of **knowledge bases** and formal representations to help solve semantic heterogeneity
- Monthly conference calls, usually the 3<sup>rd</sup> Wed.



**SOCOP INTEROP**  
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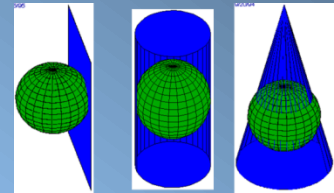
# Overlay – Integrate Layers

- **Basic reference** - geodetic, topographic, “base map”...
- **Cadastral** - land ownership, tax assessment, land tenure...
- **Administrative** - jurisdictions, zones, tracts...
- **Resource** - soils, land cover, land use, hydrography...
- **Infrastructure** - transportation, sewer, water, electric, cable...
- **Imagery** - aerial photography, satellite images, lidar...



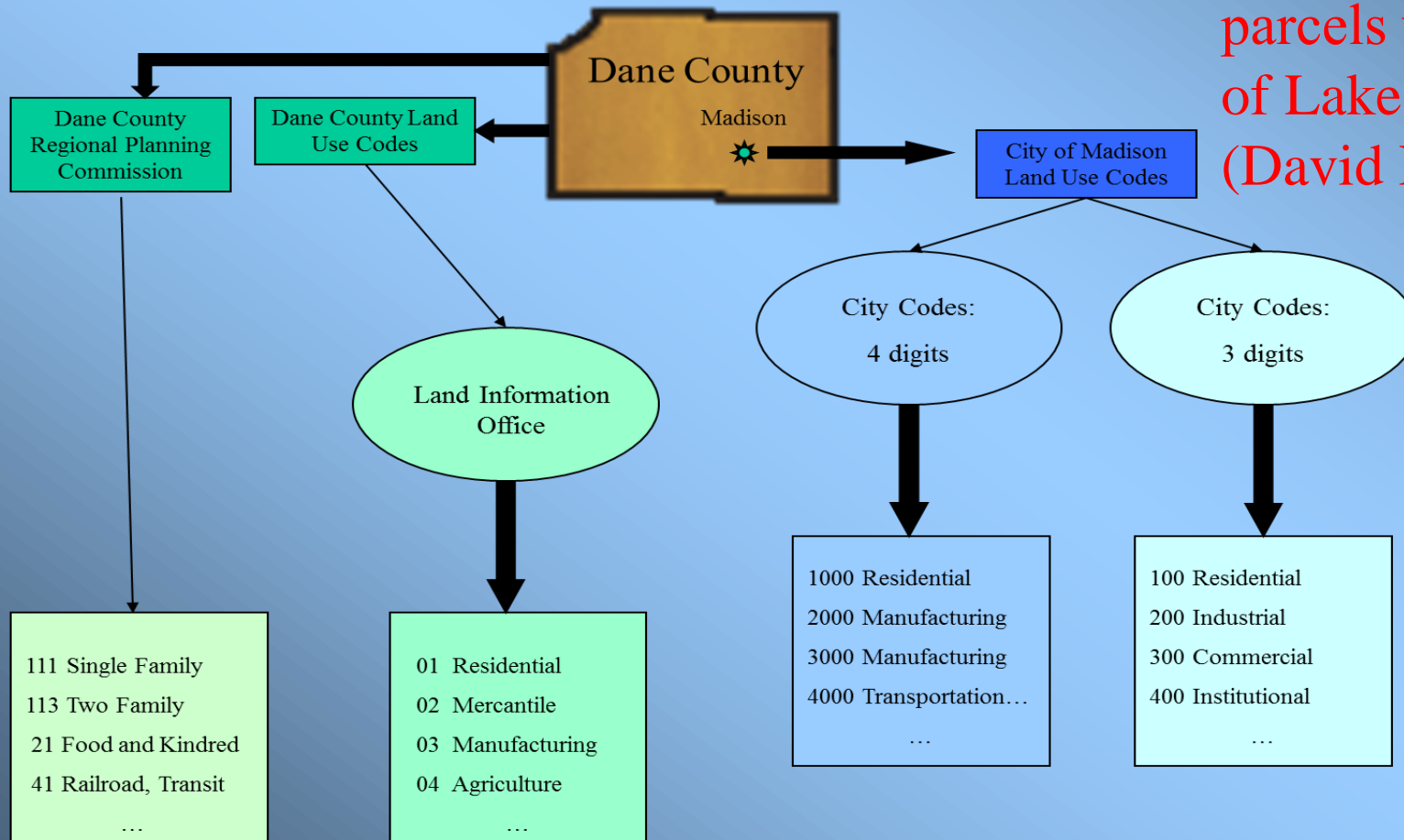
# Integration Problems

- Integrating by layers - data need to be in the same projection. This problem is mostly already solved; software will automatically re-project data.
- But, integrating geospatial data still has **semantic problems**, e.g.,
  - **horizontal** geographic integration (e.g., each county has a different land use coding system)
  - integration **through time** (e.g., categories differed in the past)
- Need automatic ‘**semantic re-projections**’



# Semantic Heterogeneity in Land Use Data

**Example High Level Categories in Land Use Codes.**



Find and aggregate  
types of land use in  
parcels within 1000'  
of Lake Michigan  
(David Hart).

-Local data  
Providers

-Classifica-  
tions change  
over time.

# Vision

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- Improve **querying** in geospatial data
  - Ontologies for semantic interoperability
- Improve **search** for geospatial data and services
  - Ontologies for metadata and background knowledge
- Semantic components have a role in **geo-architectures**
- Geospatial data in the **Linked Open Data** cloud



# INTEROP Tasks - Overview

- Cyberinfrastructure
  - Web presence – Wiki ([www.socop.org](http://www.socop.org))
  - Open Ontology Repository (OOR)
  - GeoSPARQL
  - Educational component
- Other
  - Prototypes/demos
  - Workshops/meetings



Open Ontology Repository

Browse Search Mappings Recommender Projects

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**Browse**

Access all ontologies that are available in SOCOP OOR. You can filter this list by category to display ontologies relevant for a certain domain. You can also filter ontologies that belong to a certain group. Subscribe to the SOCOP OOR RSS feed to receive alerts for submissions of new ontologies, new notes, and new projects. You can subscribe to feeds for a specific ontology at the individual ontology page. Add a new ontology to SOCOP OOR using the Submit New Ontology link.

FILTER BY CATEGORY: All Categories

FILTER BY GROUP: All Groups

FILTER BY TEXT:

Submit New Ontology

Subscribe to all updates

ONTOLOGY NAME	VISIBILITY	TERMS	NOTES	REVIEWS	PROJECTS	UPLOADED	AUTHOR
Basic Formal Ontology (BFO)	Public	26	0	0	0	12/02/2011	Holger Stenroos
DOLCE-DOLce Ultimate (DUA)	Public	25	0	0	0	12/02/2011	Aldo Gangemi
Friend of a Friend (FOAF)	Public	3	0	0	0	09/19/2011	Dan Brickley
GeoNames (GeoNames)	Public	10	0	0	0	01/15/2012	Bernard Vatant
GeoSPARQL (GeoSPARQL)	Public	0	0	0	0	09/28/2011	Matthew Perry
ISO 19103 Geographic Information Conceptual Schema Language (ISO19103)	Public	43	0	0	0	12/02/2011	Bora Beran, Akim Saifal Islam, Luis Bermudez, Stephane Fellah, Michael Piascecki
ISO 19107-2003 Geographic Information - Spatial Schema (ISO19107)	Public	102	0	0	0	12/02/2011	Bora Beran, Akim Saifal Islam, Volkan Yargic, Stephane Fellah, Michael Piascecki
ISO 19108-2003 Geographic Information - Temporal Schema (ISO19108)	Public	43	0	0	0	01/15/2012	Akim Saifal Islam, Bora Beran, Luis Bermudez, Stephane Fellah, Michael Piascecki
ISO 19111-2003 Geographic Information - Spatial Referencing by Coordinate (ISO19111)	Public	12	0	0	0	01/15/2012	Akim Saifal Islam, Bora Beran, Michael Piascecki
ISO 19112-2003 Geographic Information - Spatial Referencing by Geographic Identifier (ISO19112)	Public	7	0	0	0	01/15/2012	Akim Saifal Islam, Bora Beran, Michael Piascecki
ISO 19115-2003 Geographic Information - Metadata (ISO19115)	Public	120	0	0	0	01/15/2012	Akim Saifal Islam, Luis Bermudez, Bora Beran, Stephane Fellah, Michael Piascecki
ISO 19115-2003 Geographic Information - Metadata Application (ISO19115-APP)	Public	9	0	0	0	01/15/2012	Akim Saifal Islam, Michael Piascecki
ISO/TS 19109 Geographic Information - Rules for Application Schema (ISO19109)	Public	10	0	0	0	01/15/2012	Akim Saifal Islam, Bora Beran, Michael Piascecki
ISO/TS 19110 Geographic Information - Methodology for Feature Cataloguing (ISO19110)	Public	11	0	0	0	01/15/2012	Akim Saifal Islam, Bora Beran, Michael Piascecki
Land Use and Cover Change (LUCC)	Public	216	0	0	0	09/19/2011	Gary Berg-Cross, Dawn Parker, Gary Pothil
NeoGeo Geometry Ontology (NeoGeo-Geometry)	Public	10	0	0	0	01/15/2012	Juan Martin Salas, Andreas Harth, Barry Norton, Luis M. Villores, Alexander De Leent, John Goodwin, Claus Stadler, Sachin Anand, Dominic Harries
							Juan Martin Salas, Andreas Harth, Barry

# Workshops We Organized

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- **Spatial Semantics and Ontologies (SSO)**  
Workshop at ACM SIGSPATIAL GIS 2011  
Conference, Nov. 1, 2011
- **Terra Cognita** Workshop at the International  
Semantic Web Conference, October 2011
- **SOCoP** Workshop at the USGS in Reston, VA,  
Dec. 2, 2011
- **GeoVoCamp**, Washington, D.C., June 2011
- **SOCoP** Workshop Dec. 3, 2010, D.C. area



Thank you!



The SOCoP INTEROP Team